Appendix to "Designing Consent: Choice Architecture and Consumer Welfare in Data Sharing" by Farronato, Fradkin, and Lin

Appendix A.   Effects on Consumer Choice by Type of Dark Pattern

This appendix presents reduced-form results on the effects of specific types of dark patterns on consumer choices.

To quantify the effect of dark patterns on privacy choices, we identify the presence of reordering, highlighting, and obstructions in our treatments. This means estimating the following regression:

$$y_{ij} = \gamma_{reject\ hidden_{ij}} + \gamma_{accept\ hidden_{ij}} + \gamma_{accept\ on\ top_{ij}} + \gamma_{reject\ on\ top_{ij}} + \gamma_{highlight\ accept_{ij}} + \mu_i + \nu_{c(j)} + \epsilon_{ij},$$

$$(A.1)$$

where i indexes study participants and j indexes websites. We include participant fixed effects μ_i and website category fixed effects $\nu_{c(j)}$, where categories are based on Ghostery's taxonomy[34] and extended to the full set of websites in our study using ChatGPT.[35]

The γ indicators capture the specific nudges present in the consent interface for user i on website j: which option is placed at the top (accept or reject), which option is hidden (accept or reject), and whether the "accept all" option is visually highlighted. To interpret these coefficients relative to our treatment conditions in Figure 1, $\gamma_{accept\ on\ top_{ij}}$ represents the effect of placing "accept all" first, relative to the baseline interface (Treatment C), while $\gamma_{reject\ on\ top_{ij}}$ captures the analogous effect for prioritizing "reject all." The remaining γ coefficients reflect the incremental impact of additional nudges— hiding or highlighting— beyond the positioning of "accept all" or "reject all" at the top of the banner.

We focus on three outcomes: accepting all cookies, rejecting all cookies, and closing the window without making an active choice. Table A.1 presents the results. Columns 1–3 jointly capture how each type of dark pattern affects substitution across consent choices in the survey phase; columns 4–6 provide the corresponding analysis for the organic phase.

Deliberate obstruction emerges as the most effective dark pattern. Hiding the "reject all" button from the main screen reduces rejection rates by 17 percentage points in the survey phase (a 71% decrease) and by 9 percentage points in the organic phase (a 66% decrease). In the survey phase, participants shift both to accepting cookies, up 6.3 percentage

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[34]https://www.ghostery.com/.

[35]We used ChatGPT 4o to classify the websites. We used the following prompt: *Classify the website domains listed below into one of the following major categories (and only one of the following, do not include categories not in this list and try to limit how often other is selected): 'Reference Website', 'Entertainment Website', 'Business Website', 'E Commerce Website', 'Adult Website', 'News and Portals Website', 'Recreation Website', 'Banking Website', 'Government Website', 'Political Website', 'Other'.*

TABLE A.1. Cookie Choices by Dark Pattern

	Survey			Organic		
	Accept All (1)	Reject All (2)	Close Window (3)	Accept All (4)	Reject All (5)	Close Window (6)
Reject Hidden	0.063***	-0.171***	0.049***	0.017	-0.093***	0.060***
	(0.013)	(0.015)	(0.008)	(0.012)	(0.012)	(0.012)
Accept Hidden	-0.467***	0.179***	0.246***	-0.431***	0.065***	0.325***
	(0.020)	(0.017)	(0.018)	(0.023)	(0.012)	(0.023)
Accept Top	0.020	-0.007	-0.010	0.038**	-0.001	-0.041***
	(0.011)	(0.009)	(0.006)	(0.011)	(0.007)	(0.010)
Reject Top	0.003	0.014	-0.012*	0.004	0.020*	-0.023*
	(0.010)	(0.010)	(0.006)	(0.011)	(0.009)	(0.010)
Highlight Accept	0.015	-0.010	-0.002	-0.007	-0.014	0.021*
	(0.010)	(0.010)	(0.006)	(0.011)	(0.007)	(0.009)
Benchmark group mean	0.65	0.24	0.08	0.61	0.14	0.22
R^2	0.646	0.579	0.562	0.571	0.522	0.494
Observations	11,075	11,075	11,075	12,610	12,610	12,610
Participant fixed effects	✓	✓	✓	✓	✓	✓
Domain Cat. fixed effects	✓	✓	✓	✓	✓	✓

Notes: Regression results of Equation A.1 for three outcomes: accept all cookies, reject all cookies, and close window without making a choice. The results are presented separately for two different sets of choices: survey choices (columns 1 through 3) and organic choices (columns 4 through 6). Appendix Table A.2 presents similar results for the decision to accept a subset of cookie types. *$p < 0.05$, ** $p < 0.01$; *** $p < 0.001$.

points (a 10% increase), and to closing the window, which rises by 4.9 percentage points (a 61% increase). In the organic phase, the dominant response is to close the window, which increases by 6 percentage points (a 27% rise from an already high baseline). Hiding the "accept all" button has an even more pronounced effect, reducing acceptance rates by 47 percentage points in the survey phase (a 72% decline) and by 43 percentage points during organic browsing (a 71% decline). Participants shift primarily toward closing the window—53% do so in the survey phase and 75% in the organic phase—with a smaller share substituting toward rejecting cookies (38% in survey, 15% in organic).

In contrast, visual manipulations—i.e., reordering options and highlighting "accept all"—have more limited effects on user choices. Most coefficients are small and statistically insignificant, particularly in the survey phase. These nudges have somewhat larger effects during organic browsing, perhaps because users are not as focused on cookie preferences, but the magnitudes remain modest. For example, placing "accept all" at the top increases acceptance by only 3.8 percentage points (column 4, a 6% increase), while highlighting has no additional impact on acceptance. Similarly, placing "reject all" at the top marginally increases rejections by 2 percentages points (column 5, a 14% increase).

TABLE A.2. Selective Cookie Choice by Dark Pattern

	Survey	Organic
	Accept Some	
	(1)	(2)
Reject Hidden	0.059***	0.016*
	(0.010)	(0.007)
Accept Hidden	0.043***	0.041***
	(0.008)	(0.008)
Accept Top	-0.003	0.005
	(0.005)	(0.003)
Reject Top	-0.005	-0.002
	(0.005)	(0.004)
Highlight Accept	-0.004	0.000
	(0.004)	(0.003)
Benchmark group mean:	0.03	0.03
R^2	0.413	0.499
Observations	11,075	12,610
Participant fixed effects	✓	✓
Domain Cat. fixed effects	✓	✓

Notes: The table regressions of Equation A.1, where the outcome is whether the user selects a subset of cookies. Otherwise the table is identical to Table A.1. * $p < 0.05$, ** $p < 0.01$; *** $p < 0.001$.

Table A.2 indicates that consumers tend not to make granular cookie choices, and would rather opt out of making choices altogether by closing the consent window. In the baseline condition, only 3% of participants accept a subset of cookie types; deliberately hiding either "accept all" or "reject all" options from the main screen encourages participants to check out the settings menu, increasing the probability of granular choices by 2-6 percentage points. Among those who make granular selections, 83% choose to accept cookies for *preferences and functionality*, while only 7% accept cookies for *ad selection, delivery, and reporting* (see Appendix Table C.5). This result suggests that targeted advertising is the least preferred use of consumer data, at least among the few users who make selective choices.

Appendix B. Choice Fatigue

Next, we examine whether the attention users pay to choices changes as they see more consent banners. We compare the differences in choices between our 10-minute and 60-minute treatments to show that there isn't choice fatigue when we increase the frequency of banners.

The 10-minute treatment sees our banners in 53% of the domains they visited, while the 60-minute treatment sees these banners in 30% of the domains. Given this difference, we can see whether the frequency of choice types varies between these two conditions. We estimate the effects of this treatment in the following regression specification.

$$y_{ij} = \beta_{10\ minutes} + \gamma * time\ in\ study_{ij} + \nu_{c(j)} + \epsilon_{ij}. \tag{B.1}$$

The baseline is the condition where a user sees the banner every 60 minutes, while the alternative condition displays a banner every 10 minutes. We also control for the time a user has been in the study (post-survey), since this may be correlated with their overall engagement with the study.[36]

Table B.1 displays the results. We highlight two findings. First, we do not find a differential impact of banner frequency on data-sharing choices, whether it is the acceptance rate or the inclination to close banners. Users make similar choices, whether they see a banner every 10 or 60 minutes. These null effects are precisely estimated, as the 95% confidence interval excludes effects greater than 7%. However, we acknowledge the caveat that the difference between exposing to banners 30% vs. 53% of the time may not be large enough compared to, say, comparing banner exposure between 30% and 100% of the time.

Second, time spent in the study has an effect on choice. Each additional day in the study increases the share of people closing the banner by two percentage points. Since study participants remain in the study for 7 days, this implies that they are 14 percentage points more likely to close the window at the end of the study compared to the first day.

It is tempting to directly interpret the time in the study as another measure of choice fatigue, but it is not randomly allocated and could be correlated with underlying consumer characteristics and privacy preferences. To address this concern, in Table B.2 we add individual and hour-of-the-day fixed effects, as well as control for the order of the domain visit. Even with these covariates, we see that time in the study reduces acceptance and increases close-out. The most likely explanation for this effect is that participants reduce their engagement with the study over time.

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[36]Adding this covariate does not affect whether we detect any treatment effects.

TABLE B.1. Fatigue in Cookie Choices During Organic Browsing

	Accept All (1)	Reject All (2)	Close Window (3)
10 Min Pop-up	0.009	-0.005	-0.003
	(0.037)	(0.024)	(0.031)
Time in Study (Days)	-0.009*	-0.008**	0.017***
	(0.004)	(0.003)	(0.004)
Domain Rank (Log 10)	0.010**	-0.008**	-0.002
	(0.004)	(0.003)	(0.003)
Pre-Exp Visit	0.041**	-0.031*	-0.015
	(0.015)	(0.013)	(0.013)
R^2	0.008	0.007	0.009
Observations	12,610	12,610	12,610
Domain Cat. fixed effects	✓	✓	✓

Notes: This table shows estimates of Equation B.1, where '10 Min Pop-up' is an indicator for whether the user was in the treatment where banners occurred at a frequency of once every 10 minutes. $^*p < 0.05$, ** $p < 0.01$; *** $p < 0.001$.

TABLE B.2. Fatigue in Cookie Choices During Organic Browsing (Additional Fixed Effects)

	Accept All (1)	Reject All (2)	Close Window (3)
Visit Order / 10	-0.020*	-0.004	0.023*
	(0.009)	(0.004)	(0.009)
Time in Study (Days)	0.000	-0.003	0.005
	(0.005)	(0.003)	(0.005)
R^2	0.469	0.501	0.439
Observations	12,610	12,610	12,610
Domain Cat. fixed effects	✓	✓	✓
Participant fixed effects	✓	✓	✓
Hour fixed effects	✓	✓	✓

Notes: This table estimates a variant of Equation B.1, which removes the banner frequency treatment and adds the order of which a domain is visited ("Visit Order") and additional fixed effects. $^*p < 0.05$, ** $p < 0.01$; *** $p < 0.001$.

Appendix C. Additional Exhibits

FIGURE C.1. Cookie Manager's User Interface
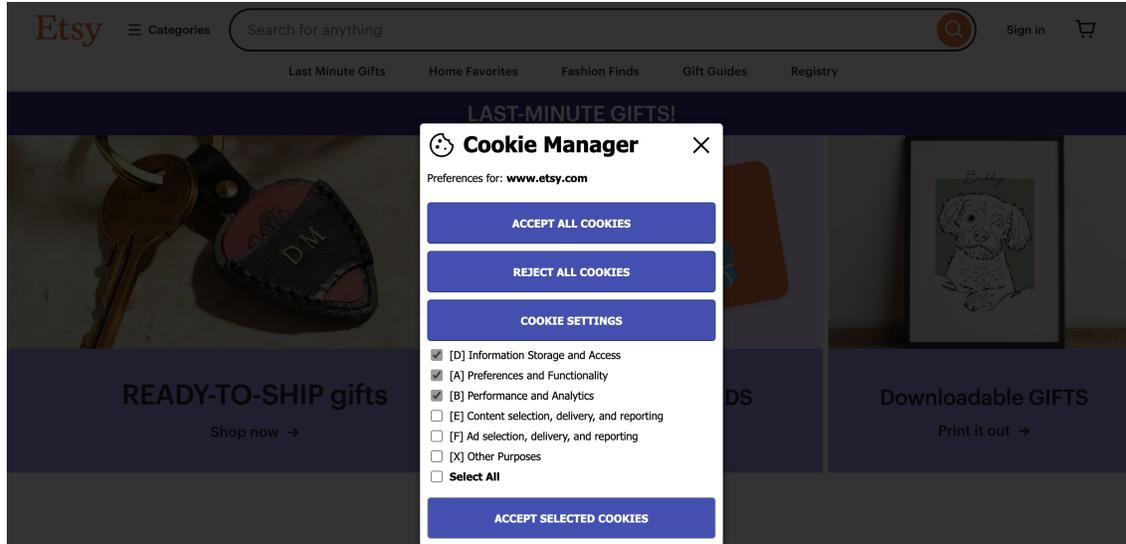
 Notes: Consent interface when a user clicks "cookie settings". The available blue buttons vary by treatment: for example, in the "accept-settings" design, the blue "Reject All Cookies" button does not show up when a user clicks "settings." However, the list of specific cookies within the settings menu is identical across treatments, meaning they can always choose to reject or select all cookies upon coming to the "settings" menu.

TABLE C.1. Websites Browsed during the Survey Phase

Domain	Domain Rank
facebook.com	3
youtube.com	8
amazon.com	28
yahoo.com	41
ebay.com	185
weather.com	325
duckduckgo.com	413
target.com	631
espn.com	278
etsy.com	301
nytimes.com	119
appleinsider.com	6319
seattletimes.com	3349
stockx.com	4547
funnyordie.com	16437
turo.com	16272
semafor.com	28266
thomannmusic.com	90809
truewerk.com	348372
merrysky.net	1000001

TABLE C.2. Number of Participants across the Experimental Funnel

Stage	N	Percent	10 min	Percentage	60 min	Percentage
1) Start Survey	1227	100				
2) Eligible for Study	917	74.74				
3) Study Consent	877	71.48				
4) Finished Survey	807	65.77				
5) Clicked All Links	808	65.85	359	100.00	418	100.00
6) Have Cookie Choice Data	767	62.51	350	97.49	410	98.09
7) After 15+ Domains Filter	687	55.99	316	88.02	371	88.76
8) After Mutual Presence Filter	602	49.06	282	78.55	320	76.56
9) Main Analysis Sample*	563	45.88	260	72.42	303	72.49
10) Finished Endline Survey	484	39.45	218	60.72	266	63.64

 Notes: This table presents the number of study participants at every step of the study. After completing the initial survey, participants are randomly allocated to two treatment conditions: 10 minutes (where cookie banners appear every 10 minutes of browsing), and 60 minutes (where cookie banners appear every 60 minutes. Due to an implementation glitch, not all users are randomized into either the 10- or 60- minute treatment; 3% of participants kept seeing a banner for every new domain visited.
*: The main analysis sample in the second-to-last line restricts attention to users who have treatment assignment to either the 10-Minute or 60-Minute group, and for whom we observe at least one cookie selection both during and after the survey.

FIGURE C.2. User Preferences for Global Privacy Control
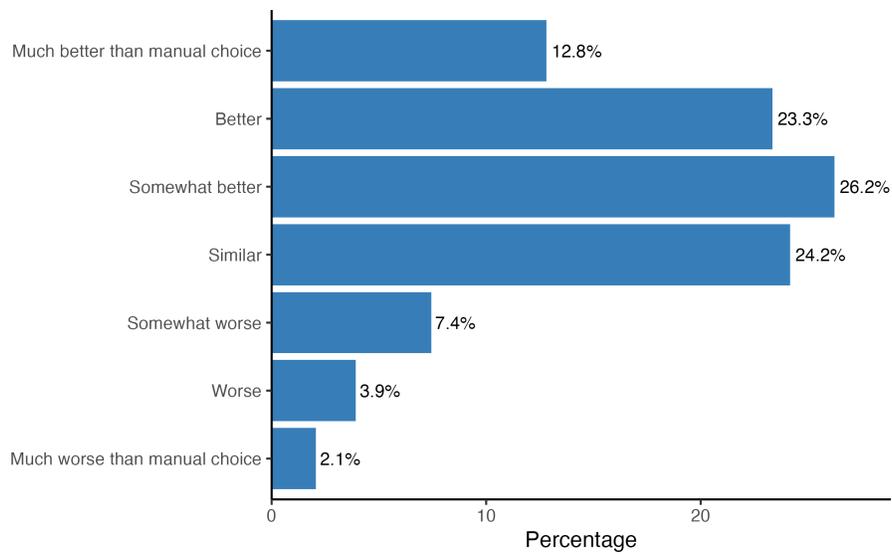
Notes: The figure plots the distribution of answers to the following question in the endline survey: Consider a tool that allows you to specify how you would like to answer cookie consent questions online. This tool will then automatically hide all cookie banners and answer them in the way you specified. For example, if you stated that you wanted to accept cookies for all websites, the tool would do so. Please select how much better or worse the tool is than manually answering the cookie consent form for each website.

TABLE C.3. Covariate Balance Check for Dark Pattern Randomization

	Age (1)	Female (2)	Bachelor's or Above (3)	Domain Rank (Log 10) (4)
Constant	38.720***	0.438***	0.182***	3.579***
	(0.196)	(0.007)	(0.006)	(0.023)
Acc-GrRej-GrSet	0.061	-0.004	-0.009	-0.034
	(0.281)	(0.011)	(0.008)	(0.033)
Acc-Rej-Set	-0.040	0.013	0.005	-0.004
	(0.281)	(0.011)	(0.008)	(0.033)
Acc-Set	-0.023	-0.001	-0.007	-0.023
	(0.280)	(0.010)	(0.008)	(0.033)
Rej-Acc-Set	0.343	0.011	-0.008	0.013
	(0.284)	(0.011)	(0.008)	(0.033)
Rej-Set	0.312	-0.008	-0.011	-0.045
	(0.286)	(0.011)	(0.008)	(0.033)
R^2	0.000	0.000	0.000	0.000
Observations	26,278	26,278	26,773	26,773

Notes: Banner design is randomized at the user X site level. $^*p < 0.05$, ** $p < 0.01$; *** $p < 0.001$.

TABLE C.4. Covariate Balance Check for Banner Frequency Randomization

	# Survey Domains (1)	Age (2)	Female (3)	Bachelor's or Above (4)
Constant	18.537***	37.460***	0.443***	0.563***
	(0.222)	(0.703)	(0.027)	(0.027)
10 Min Pop-up	0.123	1.560	0.039	-0.076·
	(0.307)	(1.037)	(0.040)	(0.039)
R^2	0.000	0.004	0.001	0.006
Observations	656	638	638	656

Notes: Banner frequency is randomized at the user level. We therefore exclude domain rank during the organic browsing, but include the number of banners exposed at the survey stage for covariate balance checks. $^*p < 0.05$, ** $p < 0.01$; *** $p < 0.001$.

TABLE C.5. Types of Cookies Accepted among People Making Granular Choices

| Cookie Type	Percentage Selected
Preferences and functionality	0.826
Information storage and access	0.627
Performance and analytics	0.601
Content selection, delivery, and reporting	0.390
Ad selection, delivery, and reporting	0.070
Other purposes	0.048

Notes: Percentage of different types of cookies selected among those who selectively accept some cookies but not all.

TABLE C.6. Selective Cookie Choice by Experimental Condition

	Survey	Organic
	Accept Some	
	(1)	(2)
Acc-Set	0.056***	0.021**
	(0.011)	(0.007)
Acc-GrRej-GrSet	-0.007	0.005
	(0.004)	(0.003)
Acc-Rej-Set	-0.003	0.005
	(0.005)	(0.003)
Rej-Acc-Set	-0.005	-0.002
	(0.005)	(0.004)
Rej-Set	0.038***	0.039***
	(0.008)	(0.007)
Benchmark group mean:	0.03	0.03
R^2	0.413	0.499
Observations	11,075	12,610
Participant fixed effects	✓	✓
Domain Cat. fixed effects	✓	✓

Notes: The table regressions of Equation 1, where the outcome is whether the user selects a subset of cookies. Otherwise, the table is identical to Table 2. *$p < 0.05$, ** $p < 0.01$; *** $p < 0.001$.

FIGURE C.3. Treatment Effects by Survey Domain (Acc-Set vs Baseline Banner)
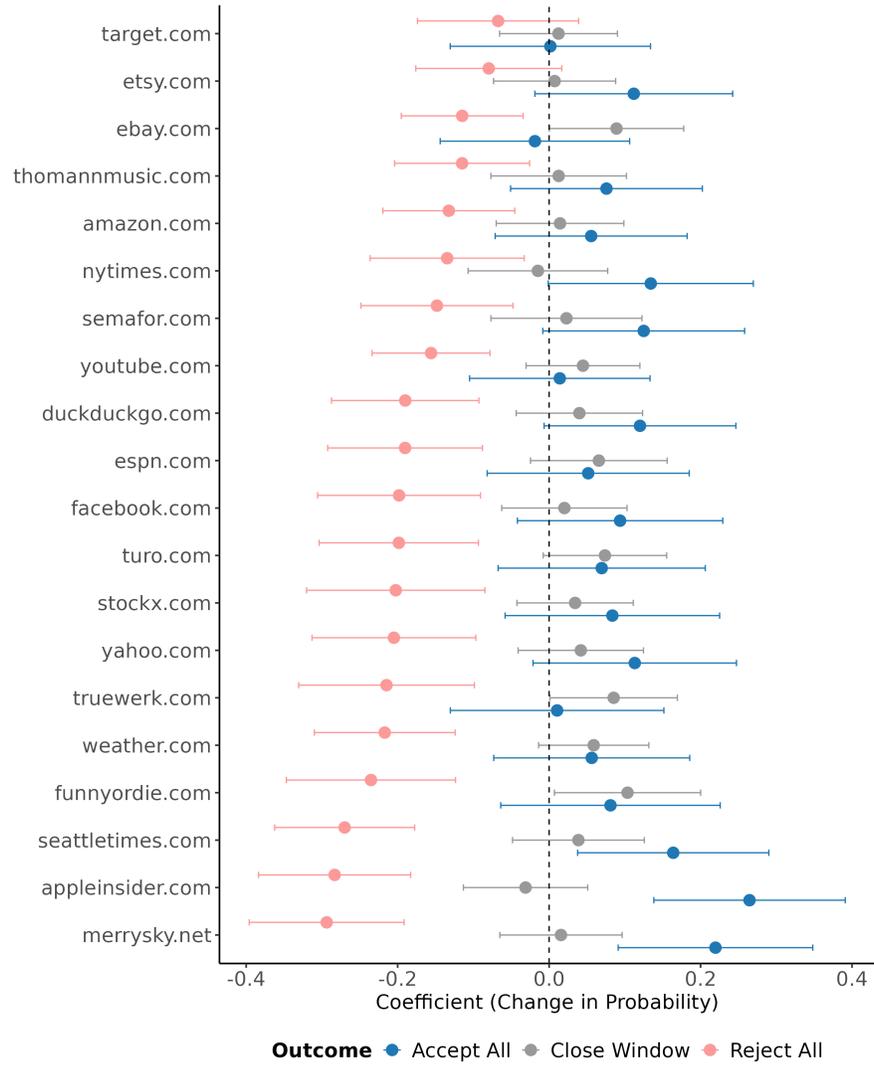
Notes: The figure displays the treatment effects (point estimates and 95% confidence intervals) of the Acc-Set condition relative to the baseline interface for each domain included in the survey phase. Estimates are obtained from separate regressions of Equation 1, conducted individually for each domain in our survey. Each color (pink, blue, and gray) denotes a different outcome.

TABLE C.7. Heterogeneity of Dark Pattern Effect by Prior Visit

	Accept All (1)	Reject All (2)	Close Window (3)
Has Prior Visit × Rej-Acc-Set	0.028	-0.009	-0.002
	(0.020)	(0.015)	(0.015)
Has Prior Visit × Acc-Set	0.007	0.038**	-0.030
	(0.018)	(0.014)	(0.016)
Has Prior Visit × Acc-GrRej-GrSet	0.011	-0.005	0.001
	(0.018)	(0.013)	(0.015)
Has Prior Visit × Acc-Rej-Set	0.017	-0.008	-0.008
	(0.019)	(0.014)	(0.016)
Has Prior Visit × Rej-Set	0.011	-0.044*	0.022
	(0.022)	(0.018)	(0.020)
Has Prior Visit	0.015	-0.029*	0.006
	(0.015)	(0.012)	(0.012)
R^2	0.517	0.471	0.421
Observations	23,685	23,685	23,685
Condition fixed effects	✓	✓	✓
Participant fixed effects	✓	✓	✓
Domain Cat. fixed effects	✓	✓	✓

Notes: The table shows regression estimates similar to Table 3, Panel *b*, except that the dummy for whether the participant visited the website in the days preceding the experiment is interacted with the banner design treatment dummies. "Condition fixed effect" refers to indicator variables for the 6 banner design conditions. $^* p < 0.05$, $^{**} p < 0.01$; $^{***} p < 0.001$.

TABLE C.8. Heterogeneity of Dark Pattern Effect by Domain Popularity

	Accept All (1)	Reject All (2)	Close Window (3)
Domain Rank (Log 10) × Rej-Acc-Set	-0.002	-0.001	0.001
	(0.005)	(0.004)	(0.004)
Domain Rank (Log 10) × Acc-Set	-0.007	0.004	0.005
	(0.005)	(0.004)	(0.004)
Domain Rank (Log 10) × Acc-GrRej-GrSet	0.000	-0.003	0.002
	(0.005)	(0.004)	(0.004)
Domain Rank (Log 10) × Acc-Rej-Set	-0.002	0.002	0.000
	(0.005)	(0.004)	(0.004)
Domain Rank (Log 10) × Rej-Set	0.005	-0.015**	0.013*
	(0.006)	(0.005)	(0.006)
Domain Rank (Log 10)	-0.010*	0.007*	0.003
	(0.004)	(0.003)	(0.003)
R^2	0.518	0.470	0.422
Observations	23,685	23,685	23,685
Condition fixed effects	✓	✓	✓
Participant fixed effects	✓	✓	✓
Domain Cat. fixed effects	✓	✓	✓

Notes: The table shows regression estimates similar to Table 3, Panel *b*, except that the domain rank (in logs) is interacted with the banner design treatment dummies. "Condition fixed effect" refers to indicator variables for the 6 banner design conditions. *$p < 0.05$, ** $p < 0.01$; *** $p < 0.001$.

TABLE C.9. Choice by Stated Privacy Choice Pattern

	Accept All (1)	Reject All (2)	Close Window (3)
Accepted Most Cookies	0.273***	-0.141***	-0.059*
	(0.024)	(0.015)	(0.023)
Rejected Most Cookies	-0.314***	0.363***	0.007
	(0.030)	(0.038)	(0.036)
R^2	0.302	0.242	0.114
Observations	23,685	23,685	23,685
Condition fixed effects	✓	✓	✓
Domain Cat. fixed effects	✓	✓	✓
Sample fixed effects	✓	✓	✓

Notes: This table presents regression estimates of cookie choices as in Equation 1, while adding participants' stated reasons for accepting or rejecting cookies, as reported in the endline survey. Each row corresponds to a binary indicator for a stated motivation (e.g., trust, functionality, distrust, unfamiliarity, privacy concerns). All regressions include fixed effects for interface condition, domain category, and study phase. Standard errors are clustered at the participant level. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

TABLE C.10. Choice by Stated Reasons to Accept/Reject

	Accept All (1)	Reject All (2)	Close Window (3)
Accepted for Trust	0.011	-0.032	-0.014
	(0.038)	(0.028)	(0.027)
Accepted for Functionality	0.045	-0.018	-0.062*
	(0.044)	(0.033)	(0.029)
Rejected for Distrust	-0.048	-0.006	0.077**
	(0.042)	(0.028)	(0.030)
Rejected for Unfamiliarity	-0.092*	0.007	0.106**
	(0.045)	(0.031)	(0.038)
Rejected for Privacy	-0.116*	0.066	0.093**
	(0.049)	(0.045)	(0.034)
R^2	0.143	0.068	0.123
Observations	21,410	21,410	21,410
Condition fixed effects	✓	✓	✓
Domain Cat. fixed effects	✓	✓	✓
Sample fixed effects	✓	✓	✓

Notes: This table presents regression estimates of cookie choices as in Equation 1, while adding participants' stated choices, as reported in the endline survey. The self-reported behavior aligns closely with actual choices: those who said they accepted most cookies are significantly more likely to accept and less likely to reject, while the reverse is true for those who reported rejecting most. All models include fixed effects for interface condition, domain category, and sample phase. Standard errors are clustered at the participant level. * $p < 0.05$, ** $p < 0.01$; *** $p < 0.001$.

TABLE C.11. Choice Variation Decomposition (Outcome: "Accept All")

	Base	With Covariates
Intercept	0.625***	0.510***
	(0.014)	(0.072)
Acc-Rej-Set	-0.002	-0.005
	(0.008)	(0.008)
Acc-Set	0.036***	0.033***
	(0.008)	(0.008)
Rej-Acc-Set	-0.026**	-0.030***
	(0.008)	(0.008)
Rej-Set	-0.475***	-0.480***
	(0.008)	(0.008)
Set-Acc-Rej	-0.031***	-0.032***
	(0.008)	(0.008)
SD (Participant)	0.304	0.304
SD (Domain)	0.058	0.046
SD (Residual)	0.343	0.342
Num.Obs.	23685	23190

Notes: This table presents estimates of treatment effects models where random effects for participant and domain are included in the regression. The second column adds controls for website characteristics, demographics, and privacy beliefs presented in Table 3. The outcome is a dummy for whether a user accepts all cookies.

TABLE C.12. Consumer Surplus Under Counterfactual Policies (Utility Scale Results)

Counterfactual	Average	Type 1 Acceptors	Type 2 Rejectors	Type 3 Discerners
U.S. Status Quo	1.87	3.29	-2.79	2.35
EU Norm	2.47	3.23	0.97	2.24
Optimal Banner Interface	2.52	3.57	-0.14	2.49
Optimal Banner Interface (with correct beliefs)	2.78	3.79	0.64	2.55
Global Accept	5.69	8.47	0.4	4.79
Global Reject	4.9	5.81	5.36	3.58
Global Privacy Control	6.56	8.47	5.36	4.79

Notes: The values represent unscaled consumer surplus *per choice* under various counterfactual policies in the utility scale. "Pooled estimate" refers to the estimate across all subjects, and the other columns correspond to subset-specific estimates. "U.S. status quo" refers to an accept-settings interface, combined with an accept-all default when consumers close window; "CS maximizing" refers to a baseline interface with an accept-all default when consumers close window; "EU norm" refers to a baseline interface with a reject-all default when consumers close window. "Global Accept" and "Global Reject" force each individual to either always accept or always reject all cookies. The last row, "Global Privacy Control," allows each individual to make their preferred global choice.

Appendix D.   Survey Questions

This appendix presents the Qualtrics surveys used in the study:

- Intake.
- Outtake.

Device Transfer

The rest of the survey needs to be done on a Chrome browser. Please copy the link of the survey and reopen it in a Chrome browser to continue.

First Page

Would you like to help us understand online behavior and privacy choices? We are a team of Harvard and Boston University researchers who study the internet and how it affects society.

The study will take 30 minutes of your time over the course of the next day. We will ask you to fill out two surveys, clear the cookie data stored in your browser, install a browser extension vetted by Harvard and Boston University and keep it installed for seven days, and share information about your online behavior. Click below if you want to know more and discover if you qualify!

Eligibility Questions

Do you live in the United States?

No

Yes

Are you over 18 years old?

Yes

No

What is 12 minus 4? Regardless of the correct answer, you should always select the option with the value "seven". This is an attention check question.

6

8

7

5

What is the language you primarily speak?

Spanish

English

[   ] Other (please specify)

Which browser do you primarily use?

Others

Internet Explorer

Chrome

Microsoft Edge

Safari

Firefox

What was your total household income before taxes during the past 12 months?

Less than $25,000

$25,000-$49,999

$50,000-$74,999

$75,000-$99,999

$100,000-$149,999

$150,000 or more

Prefer not to say

What is the highest level of education you have completed?

Some high school or less

High school diploma or GED

Some college, but no degree

Associates or technical degree

Bachelor's degree

Graduate or professional degree (MA, MS, MBA, PhD, JD, MD, DDS etc.)

Prefer not to say

Not Eligible

Thank you for your answers! Unfortunately, you do not qualify to participate in our study.
Can you please return your submission on Prolific?

Consent

Congratulations! You are qualified to participate in our study.

Study Overview

The following is a summary with key information to help you decide whether you want to participate.

Why am I being invited to take part in a research study?
We invite you to take part in this research study because you are an English-speaking resident of the United States who uses Chrome to browse the web.

What should I know about a research study?
Research studies are conducted to better understand the choices we make. Whether or not you take part is completely up to you. Your decision will not be held against you. You can ask all the questions you want before you decide. You can even agree to take part and later change your mind.

Why is this research being done?

We want to better understand the online experience of people like you, how companies obtain user consent for the collection and use of their data, and how this affects user browsing experience. We hope that the results of this research will help inform data privacy policy.

How long will the research last and what will I need to do?

The study will last several days, but we will only ask you for 30 minutes of your time. Everything we ask you to do to participate in this research can be done from the comfort of your home. If you choose to participate, we'll ask you to:

- Complete two surveys:
    - The first survey will ask you some questions about yourself and your online browsing behavior. It will also ask you to visit some websites and make privacy choices.
    - The second survey will ask you about your experience during the study.
- Install the Cookie Manager browser extension, which is an application we developed for this study. We'll have instructions for you. The Cookie Manager extension will record your behavior and may tweak the interfaces through which you make cookie selections.
- Keep the extension installed for seven days, until the extension prompts you to uninstall it.

Will I be compensated for participating in this research?

Yes. You will be paid $7.50 after completing the two surveys and keeping the Cookie Manager extension installed for several days.

Is there any way being in this study could be bad for me?

Since we may collect personal information, there is a risk of breach of confidentiality. We have worked hard to minimize this risk. For example, we will encrypt any data before storing it. Before accessing the data for analysis, we will also permanently delete all personal information that we may intentionally or unintentionally collect.

Will being in this study help me in any way?

We cannot promise any benefits to you or others from your taking part in this research. It

is possible, however, that our tweaks to your online browsing lead to a better (or worse) online experience.

Detailed Information

Withdrawing from the Study.

You can leave the research at any time; your decision will not be held against you. We may use the data you have shared with us prior to withdrawing as part of the study. We will provide simple instructions for how you can withdraw. Researchers can remove you from the research study without your approval. Possible reasons for removal include not complying with instructions to install the browser extension or intentionally avoiding data tracking through the extension.

Privacy.

Data security and privacy are important to us. During the course of the study we may collect personal information. The personal information that we know we are collecting will be deleted immediately. Other personal information that we inadvertently collect will be stored but removed after we finish collecting data.

We cannot promise complete secrecy, although efforts will be made to limit the use and disclosure of your personal information. Data will be encrypted and stored on secure servers and cannot be accessed by anyone outside the research team. At no time will study information be available over any public or private network in an unencrypted state.

In the future, when we publish our research, we will post anonymized data from this study in a data repository so that other researchers can reproduce our results. By then, no information that can identify you personally will be available, to us or others. We will not sell data from the study or share data for any commercial or marketing purposes.

Who can I talk to?

If you have questions, concerns, or complaints, or think the research has hurt you, do not hesitate to reach the research team on Prolific or <u>cookie.manager.study@gmail.com</u>.

Please indicate below whether you agree to participate in the study. Agreeing to participate means you are willing to install Cookie Manager (our web browser extension) for seven days, and complete the two surveys.

I agree to participate

I do not agree to participate

Not consent

Thank you for letting us know you do not want to participate. **Can you please return your submission on Prolific?**

Email

Thank you for your willingness to participate in our study!

Next, we will ask you to install *Cookie Manager*, a browser extension we developed to identify website tracking and to enable simplified privacy consent dialogs.

After installing the extension, you will see a consent-request popup window whenever you visit a website for the first time. If you make a choice, the extension will try to pass on your choices to the website. In most cases, if the website has already been collecting consent from users, it will recognize your choice and decide whether to continue tracking you based on your choice.

App Installation

Cookie Manager Installation Instructions.
To install Cookie Manager, please **use Chrome** on the computer that you are using for online shopping:
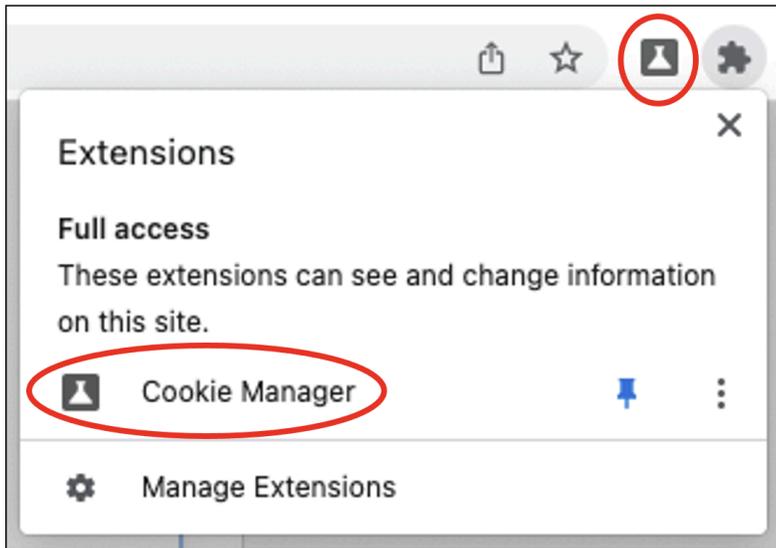
- Click here.
- Click "Add to Chrome."
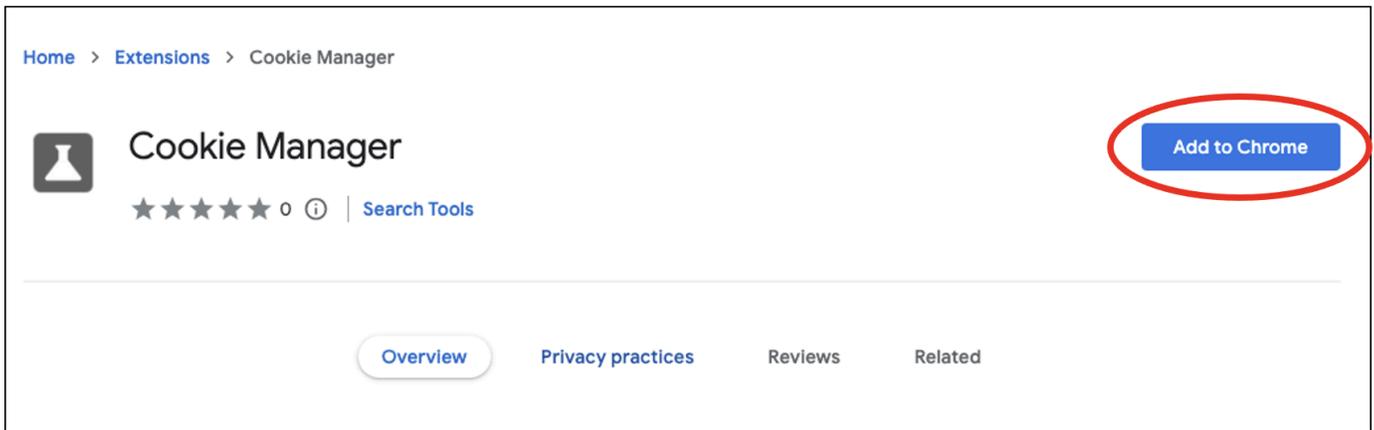
- When prompted, click "Add Extension."
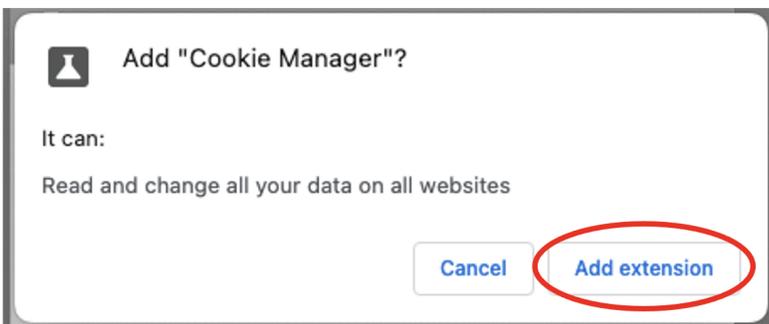
- You will be prompted to add your prolific id.
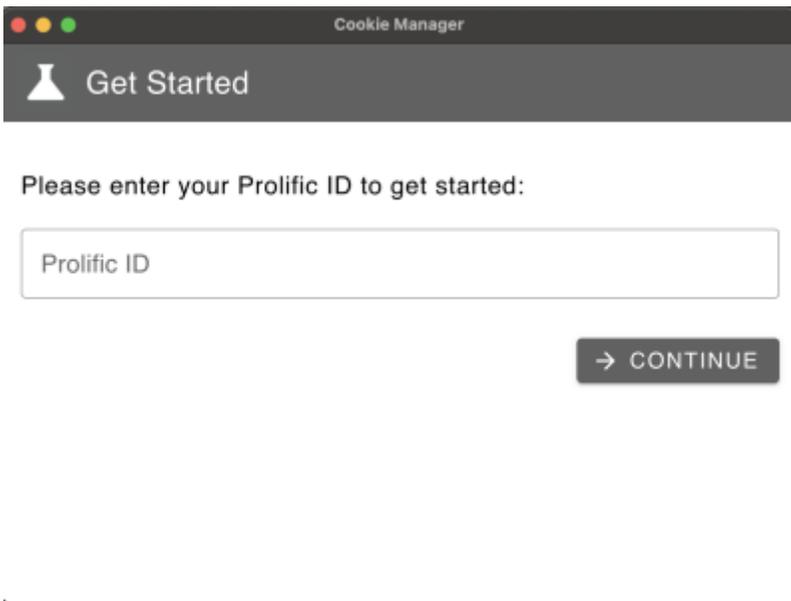
- You should now see the Cookie Manager icon on the top right corner of your browser. If you don't see it, it may be hidden under the puzzle icon, which is visible in the upper right corner of the screenshot below.

- You are all set.

If you have trouble installing Cookie Manager, email us at cookie.manager.study@gmail.com and we will help you with additional instructions.

Were you able to successfully install the extension?

Yes
No

What difficulties have your encountered when installing the extension?

Clear Browsing History

Next, we will ask you to clear your cookie data. Please navigate to chrome://settings/privacy?search=clear (copy and paste the address directly on your

search bar), and click on "Clear Browsing Data". Then select **only 'cookies and other site data'**, and click clear data.
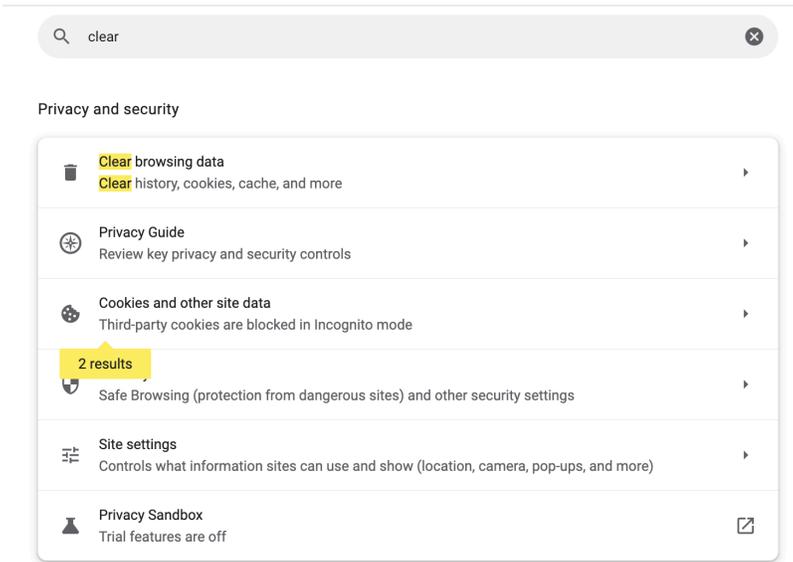
Select the time range to be **"All Time"** and select the cookies and other data check box, as seen below. Then click "Clear Data."
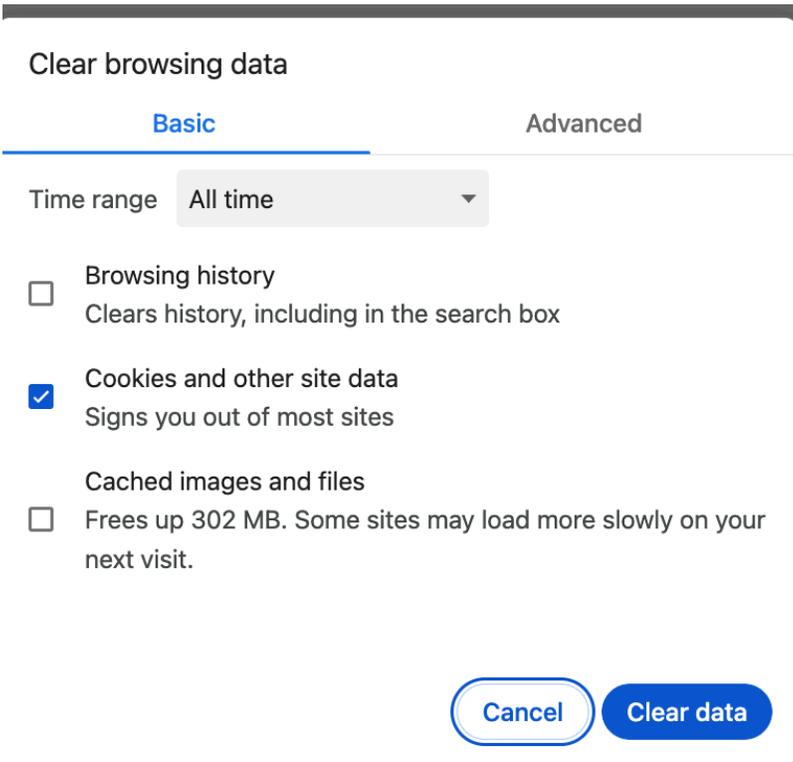
Were you able to clear your cookie data?

Yes

No

Intro to website navigation

Now that you have *Cookie Manager* installed, we will ask you to visit a list of 20 websites. Please wait until a banner shows up for each site and interact with the banner as you normally would. We will ask you to answer a few questions after each visit. After you finish the survey task, the frequency of pop-ups will drastically decrease.

Note: for your browsing action to be correctly registered in our database, please directly left-click on the link on the survey page to navigate to the website. If instead you right-click on the link and select "open on a new tab", a warning will continue showing up, meaning that our database has not recognized your click action.

YouTube

Please use Chrome to navigate to youtube.com. Please wait until a banner shows up. Search for a video of your choice.
You haven't clicked on the link

Do you normally visit Youtube?

Yes

No

Have you ever heard of Youtube?

Yes

No

How often do you normally visit Youtube?

At least once a day

At least once a week

Less than once a week

Never

New York Times

Please use Chrome to navigate to nytimes.com. Please wait until a banner shows up. Click on an article of your choice.

You haven't clicked on the link

Do you normally visit NYTimes?

Yes

No

Have you ever heard of New York Times?

Yes

No

How often do you normally visit New York Times?

At least once a day

At least once a week

Less than once a week

Never

Apple Insider

Please use Chrome to navigate to appleinsider.com. Please wait until a banner shows up. Click on an article of your choice.

You haven't clicked on the link

Do you normally visit Apple Insider?

Yes

No

Have you ever heard of Apple Insider?

Yes

No

How often do you normally visit Apple Insider?

At least once a day

At least once a week

Less than once a week

Never

Yahoo

Please use Chrome to navigate to yahoo.com. Please wait until a banner shows up. Click on an article of your choice.
You haven't clicked on the link

Do you normally visit Yahoo?

Yes

No

Have you ever heard of Yahoo?

Yes

No

How often do you normally visit Yahoo?

At least once a day

At least once a week

Less than once a week

Never

Amazon

Please use Chrome to navigate to amazon.com. Please wait until a banner shows up. Search for a product of your choice.

You haven't clicked on the link

Do you normally visit Amazon?

Yes

No

Have you ever heard of Amazon?

Yes

No

How often do you normally visit Amazon?

At least once a day

At least once a week

Less than once a week

Never

eBay

Please use Chrome to navigate to ebay.com. Please wait until a banner shows up. Search for a product of your choice.

You haven't clicked on the link

Do you normally visit eBay?

Yes

No

Have you ever heard of eBay?

Yes

No

How often do you normally visit eBay?

At least once a day

At least once a week

Less than once a week

Never

What is 6 divided by 2? Regardless of the correct answer, you should always select the option with the value "one". This is an attention check question.

2

3

1

Target

Please use Chrome to navigate to target.com. Please wait until a banner shows up. Search for a product of your choice.

You haven't clicked on the link

Do you normally visit Target?

Yes

No

Have you ever heard of Target?

Yes

No

How often do you normally visit Target?

At least once a day

At least once a week

Less than once a week

Never

Etsy

Please use Chrome to navigate to etsy.com. Please wait until a banner shows up.
Search for a product of your choice.
You haven't clicked on the link

Do you normally visit Etsy?

Yes

No

Have you ever heard of Etsy?

Yes

No

How often do you normally visit Etsy?

At least once a day

At least once a week

Less than once a week

Never

Turo

Please use Chrome to navigate to turo.com. Please wait until a banner shows up. Click on a car of your choice.
You haven't clicked on the link

Do you normally visit Turo?

Yes

No

Have you ever heard of Turo?

Yes

No

How often do you normally visit Turo?

At least once a day

At least once a week

Less than once a week

Never

StockX

Please use Chrome to navigate to stockx.com. Please wait until a banner shows up. Search for a product of your choice.
You haven't clicked on the link

Do you normally visit StockX?

Yes

No

Have you ever heard of StockX?

Yes

No

How often do you normally visit StockX?

At least once a day

At least once a week

Less than once a week

Never

ESPN

Please use Chrome to navigate to espn.com. Please wait until a banner shows up. Click on an article of your choice.
You haven't clicked on the link

Do you normally visit ESPN?

Yes

No

Have you ever heard of ESPN?

Yes

No

How often do you normally visit ESPN?

At least once a day

At least once a week

Less than once a week

Never

Facebook

Please use Chrome to navigate to facebook.com. Please wait until a banner shows up.
Scroll down.
You haven't clicked on the link

Do you normally visit Facebook?

Yes

No

Have you ever heard of Facebook?

Yes

No

How often do you normally visit Facebook?

At least once a day

At least once a week

Less than once a week

Never

Funny Or Die

Please use Chrome to navigate to funnyordie.com. Please wait until a banner shows up. Click on an article of your choice.

You haven't clicked on the link

Do you normally visit Funny Or Die?

Yes

No

Have you ever heard of Funny Or Die?

Yes

No

How often do you normally visit Funny Or Die?

At least once a day

At least once a week

Less than once a week

Never

Weather

Please use Chrome to navigate to weather.com. Please wait until a banner shows up. Search for a location.

You haven't clicked on the link

Do you normally visit Weather.com?

Yes

No

Have you ever heard of Weather.com?

Yes

No

How often do you normally visit Weather.com?

At least once a day

At least once a week

Less than once a week

Never

DuckDuckGo

Please use Chrome to navigate to duckduckgo.com. Please wait until a banner shows up. Search for a product of your choice.
You haven't clicked on the link

Do you normally visit DuckDuckGo?

Yes

No

Have you ever heard of DuckDuckGo?

Yes

No

How often do you normally visit DuckDuckGo?

At least once a day

At least once a week

Less than once a week

Never

Truewerk

Please use Chrome to navigate to truewerk.com. Please wait until a banner shows up and navigate to an item.

You haven't clicked on the link

Do you normally visit Truewerk?

Yes

No

Have you ever heard of Truewerk?

Yes

No

How often do you normally visit Truewerk?

At least once a day

At least once a week

Less than once a week

Never

Thomann

Please use Chrome to navigate to thomannmusic.com. Please wait until a banner shows up and navigate to an item.

You haven't clicked on the link

Do you normally visit Thomann Music?

Yes

No

Have you ever heard of Thomann Music?

Yes

No

How often do you normally visit Thomann Music?

At least once a day

At least once a week

Less than once a week

Never

MerrySky

Please use Chrome to navigate to merrysky.com. Please wait until a banner shows up and search for a location.

You haven't clicked on the link

Do you normally visit Merry Sky?

Yes

No

Have you ever heard of Merry Sky?

Yes

No

How often do you normally visit Merry Sky?

At least once a day

At least once a week

Less than once a week

Never

Seattle Times

Please use Chrome to navigate to seattletimes.com. Please wait until a banner shows up and then click on an article.

You haven't clicked on the link

Do you normally visit Seattle Times?

Yes

No

Have you ever heard of Seattle Times?

Yes

No

How often do you normally visit Seattle Times?

At least once a day

At least once a week

Less than once a week

Never

Semafor

Please use Chrome to navigate to semafor.com. Please wait until a banner shows up and then click on an article.

You haven't clicked on the link

Do you normally visit Semafor?

Yes

No

Have you ever heard of Semafor?

Yes

No

How often do you normally visit Semafor?

At least once a day

At least once a week

Less than once a week

Never

Favorite website

Navigate to your favorite e-commerce website. Please wait until a banner shows up. Search for a product of your choice.

Paste the URL of the product below:

Did you see a cookie consent banner?

Yes

No

Did you make a choice on whether to allow for cookie sharing?

Yes, I allowed my preferred cookies and blocked unwanted cookies

Yes, I chose the default cookie sharing

No, I closed the cookie consent banner

No, I left the website without interacting with the consent banner

Questionnaire

Think about your browsing experiences on a typical day. Overall, how frequently do you encounter cookie consent banners?

Too frequently

A bit more frequently than ideal

Just right

A bit less frequently than ideal

Too infrequently

Overall, how would you rate the ease of navigation of the cookie consent interfaces on the websites you visit?

Very easy to navigate

Moderately easy to navigate

Neither easy nor hard to navigate

Moderately hard to navigate

Very hard to navigate

Overall, how would you rate the ease of making your preferred choices regarding cookie sharing on the websites you visit?

Very easy

Moderately easy

Neither easy nor hard

Moderately hard

Very hard

Which of the following best describes your behavior when deciding whether to share cookies online?

I reject most cookies

I consider both the website that is asking and the types of cookies involved before deciding whether to share them

I accept most cookies

I decide whether to share cookies based on what type of cookies they are

I decide whether to share cookies based on which website is asking

Part1-conclude

Thank you! To finish the rest of the study, we ask you to keep Cookie Manager installed for another seven days. You can continue your browsing activities as usual during this time. The frequency of pop-ups will drastically decrease over time. After the seven days have passed, the extension will prompt you with a survey and the instructions on how to uninstall the extension.

There is no completion code, since our system will detect completion automatically. Please make sure to click the next button below so that we register your response.

Powered by Qualtrics

Intro Page

Thank you for finishing our web browsing task! Now we will walk you through the uninstallation process of the browser extension. To complete the study, we just need to ask you a few more questions about the web browsing and cookie-sharing experiences while using our extension and in general.

Block 1

Think back about your browsing experiences after completing our 20-website visit task while Cookie Manager is installed. Overall, what do you think of the frequency with which cookie consent banners appear during that time?

Too frequent

A bit more frequent than ideal

Just right

A bit less frequent than ideal

Too infrequent

Block 2

Overall, how will you rate the ease of navigation of the cookie consent interface created by our browser extension?

Very easy to navigate

Moderately easy to navigate

Neither easy nor hard to navigate

Moderately hard to navigate

Very hard to navigate

Block 3

Overall, how will you rate the ease of making your preferred cookie sharing choices created by our browser extension?

Very easy

Moderately easy

Neither easy nor hard

Moderately hard

Very hard

Block 4

In the past week, which of the following statement best describes your behavior when deciding whether to share cookies online?

I accepted most cookies

I rejected most cookies

I chose whether to share cookies based on which website is asking

I chose whether to share cookies based on what types of cookie it is

I chose whether to share cookies based on what website is asking and what types of cookie it is

Why choice

Think back to a case when you accepted all cookies during the course of the study. Why did you do so?

Think back to a case when you chose **not** to accept all cookies during the course of the study. Why did you do so?

Block 5

Overall, how do you think the Cookie Manager extension changes your web browsing experience?

It improves my browsing experience by a lot
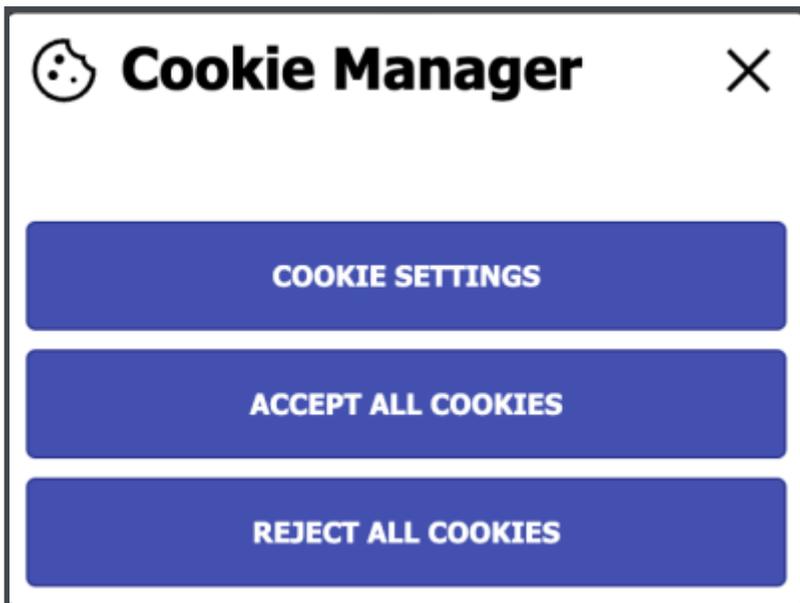
It improves my browsing experience slightly

It neither improves nor degrades my browsing experience

It degrades my browsing experience slightly

It degrades my browsing experience a lot

Block 12

Consider the cookie consent form below.

One option is to hit the 'x' button in the upper right. If you were to click this 'x', what do you think will happen?

All cookies are accepted.

None of the cookies are accepted.

[   ] Other, please explain:

Block 8

During the study period, did you take any actions to change how you browse the internet?

No

Yes, I used a different browser or device.

Yes, I browsed the internet less.

[   ] Yes, I did something else. Please specify.

Block 9

As you browse the internet, which information do you think advertisers have about you? Check all that apply.

Your demographic information

Your prior website visits

Your interests

Your prior purchases

Your social media posts

Your address

Your credit score

Block 10

Thinking about privacy polices you might come across online or on your smartphone. Which of the following comes closer to your view, even if neither is exactly right?

Just something I have to get past in order to use a product or service.

A meaningful part of my decision to use a product or service.

Privacy means different things to different people today. In thinking about all of your online browsing, please state how important it is for you to be in control of who can get info about you.

	Not all imporant	Not very imporant	Somewhat Important	Very Imporant
	1	2	3	4
	○	○	○	○

Block 11

What do you think are the benefits of sharing the data listed above with the advertisers?

What do you think are the costs of sharing the data listed above with the advertisers?

Block 6

Do you have any suggestions to help us improve the design of the Cookie Manager extension or the design of our study in general?

[   ]

Block 14

Consider a tool that that allows you to specify how you would like to answer cookie consent questions online. This tool will then automatically hide all cookie pop-ups and answer them in they way you specified. For example, if you stated that you wanted to accept cookies for all websites, the tool would do so.

Please select how much better or worse the tool is than manually answering the cookie consent form for each website.

Much worse than manual choice	Worse	Somewhat worse	Similar	Somewhat better	Better	Much better than manual choice
○	○	○	○	○	○	○

How much would you be willing to pay for the tool?

Please enter the price in the text box below.

[   ]

Instructions for how to download and configure the tool, called Consent-O-Matic, are available here.

Please click the arrow below to continue the survey.

Block 7

Thank you! We will ask you to upload your data to us prior to uninstalling the extension. Please click on the Cookie Managert extension icon in your Chrome browser.

You should see a pop-up. Please click on the cloud button with an arrow. Completing this step ensures that your participation in our study and the associated data are properly recorded.
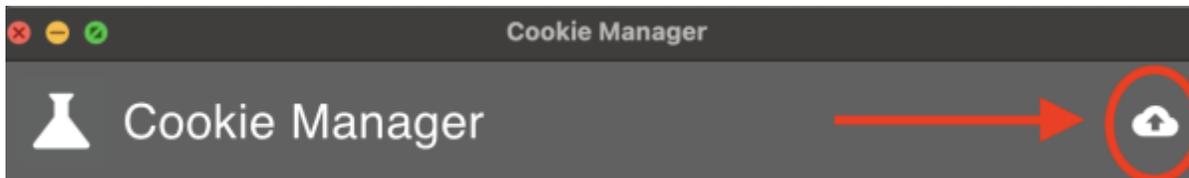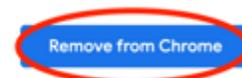

Now that you've clicked the cloud button, you can now proceed to uninstall the extension. Completing this step ensures that we stop collecting your browsing data going forward.
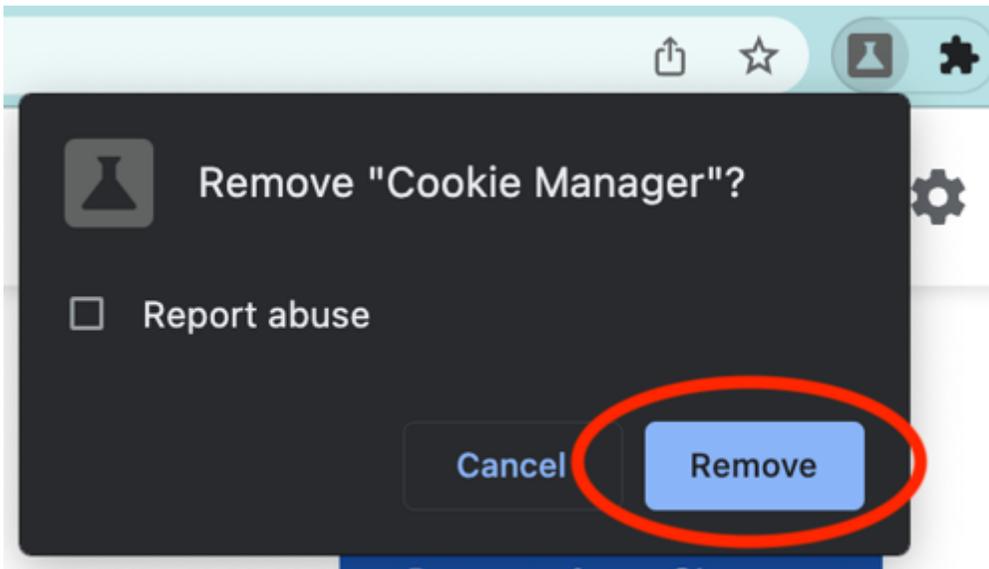
Here's how you can remove the cookie manager extension:
- Click here.
- Click "Remove from Chrome."

- Confirm by clicking "Remove" on the pop-up window appearing on the top right corner of your browser.

- You're all set.

If you have trouble uninstalling Cookie Manager, email us at
cookie.manager.study@gmail.com and we will help you with additional instructions.

Please click the arrow below to finish the survey.

Powered by Qualtrics